Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Anisotropic surface plasmon excitation in Au/silica nanowire by STEM-EELS C. T. WU, C. W. CHEN, Dept. MSE, NTU, Taiwan, K. H. CHEN, IAMS, Academia Sinica, Taiwan, L. C. CHEN, M. -W. CHU, C. H. CHEN, CCMS, NTU, Taiwan — Recently it was reported that Au nanoparticles encapsulated in silica or Ga_2O_3 nanowires (Au nano-peapods) exhibited remarkable enhancement of photo-induced conductivities when irradiated with a light source with wavelength close to the surface plasmon resonance (SPR) of Au at ∼2.4 eV. No photo-response of the Au nano-peapods was observed when excited with light sources with wavelengths far away from the SPR. These observations strongly suggested that excitation of SPR might be responsible for the enhanced photoconductivity. Here we report the SP excitations of gold nanoparticles embedded nicely in silica nanowires by electron energy-loss spectroscopy (EELS) in conjunction with a scanning transmission electron microscope (STEM). In this study, we'll show that the STEM-EELS and energy-filtered TEM are important tools with very high spatial resolution for the mapping of optical excitation of surface plasmon for novel-metal nano-particles. Furthermore, anisotropic SP excitation intensities were observed along the axial and radial directions of the Au-silica nanowire after corrections for the thickness effect. This anisotropy of SP excitations suggests that the photo-induced electronic transport may be concentrated in a region near the surface of the Au-silica nanowire.

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Date submitted: 20 Nov 2009 Electronic form version 1.4